ASSAP MOPS Group Meeting Minutes #3

The attendees included the following:

Last Name	First Name	Organization
Bailey	Louis	Boeing
Branch	Allen	FAA/AIR-CERT
Chamlou	Roxaneh	MITRE/CAASD
Conway	Sheila	NASA
Eich	Tom	ACSS
Hammer	Jonathan	MITRE/CAASD
Samanant	Paul	Honeywell
Skaves	Peter	FAA/AIR-CERT
Sleight	Randy	FAA/JHU APL
Spenser	David	MIT/LL
Thomas	Dave	FAA/L-3 TITAN
Tsuchida	Dean	Boeing
Walker	Don	Honeywell
Wang	Ganghuai	MITRE/CAASD
Wichgers	Joel	Rockwell Collins

DAY 1:

The ASSAP MOPS group meeting, on 22 August 2006, started at 9:15 AM (Pacific Time). Roxaneh, chairman, started the meeting with introductions and reviewing the proposed agenda.

1. The proposed agenda was accepted with no changes. Also the last group meeting and telecon minutes were accepted as is.

2. Update on status presented to the SC-186 Plenary. The ASSAP MOPS schedule was discussed at the plenary. The FAA requested that the ASSAP MOPS document be completed and finalized by March, 2008. The plenary will agree on the schedule soon.

3. Follow-on telecons and group meetings:
    a. Next telecon scheduled for September 20, 2-4 EST.
    b. Next group meeting is tentatively scheduled for November 7-9 which has been changed since the date discussed at this meeting (was the week of October 23rd). The location will be at RTCA headquarters in Washington, DC.
    c. January 8-12 at Phoenix (TBC)

4. Discussion on CD Application – Metrics, Algorithm, Requirements (Ganghuai Wang / MITRE) Ref. CD-briefing-2006-08-16.ppt
    a. CAZ and CDZ calculations were presented.
    b. The testing and requirement analysis used real operational data from various airport facilities. Also, scenarios developed by RTCA SC186 WG1 were used for GA traffic patterns.

c. The minimum accuracy and integrity values determined from the analysis accounted for both own-ship values and the other traffic values.
d. **Action Item (Ganghuai Wang / MITRE):** Provide a corrected slide due to a typo with one of the equations.

5. Discussion on EVacq– Integrity Discussion and Safety Analysis (Don Walker / Honeywell) Ref. EnhancedVisualAcquisitionIntegrityDiscussion.ppt
    a. **Action item:** Don mentioned that the Capstone program considers traffic degraded when the accuracy is worse than 0.5Nm. Also, traffic is never removed from the display based on accuracy or integrity. The EVaq application in the ASA MASPS requires traffic to be removed when the bearing uncertainty is greater than 60 degrees based on accuracy (NACp) and range. The ASSAP MOPS group request someone from the Capstone project provide background information regarding their traffic requirements. (Post meeting editorial note from Roxaneh: ASA MASPS guidance was not available when Capstone implemented the CDTI.)
    b. **Action item (Tom M. from Garmin, Bob S. from Collins, Tom E. from ACSS, etc.):** Don's presentation included an analysis explaining how Honeywell transponders (DO-260 version 0) meet the minimum integrity requirements defined in the ASA MASPS. The ASSAP group request that other transponder manufacturers present a similar analysis and explain how NUCp is encoded on their current transponders.
    c. Based on Don's presentation, DO-260 version 0 equipment should be several magnitudes better than the minimum integrity requirements in the ASA MASPS for EVaq, suggesting that DO-260 version 0 is acceptable.
    d. Don mentioned that scaling for Rc needs to be proposed and accepted; Joel W. has an action item regarding this issue.

6. Issue # S6: What are the risks/issues for requiring DO-260A vs. DO-260
    a. Peter Skaves from the FAA presented two presentations regarding ADS-B out (reference ADS-B Out 1-25-06.ppt and DO-260A 1090 MHz ES.pdf)
    b. Don Walker asked how a manufacturer should proceed with the assumption that DO-260 version 0 is acceptable. Peter recommended that a safety analysis be submitted to approve installations that use DO-260 version 0. Based on Don's presentation above, Honeywell's safety analysis suggest that DO-260 version 0 is acceptable for EVaq.
    c. Currently, it is difficult for the manufactures to have any control of what others are sending out for ADS-B due to implementation or poor installations. Peter mentioned that there will be no mandates for people transmitting ADS-B out in the near-future.
    d. Peter mentioned that there will not be a mandate for at least 9 to 10 years for the new parameters required for ADS-B out.
    e. **Action Item (Peter Skaves):** Peter will provide the group a list of technical difference between DO-260 and DO-260A.

7. Issue # I5: What is the priority selection logic of tracks shown on the CDTI? (Presentation by Tom Eich)
    a. The presentation proposed the following priority: RA alerts, TA alerts, ASA Application Alerts, Coupled traffic, Selected traffic, and then those closest in range.
    b. **Action Item (Don Walker and Tom Eich):** Verify if the TCAS track priority is based on TAU (i.e., time to CPA) or closest in range. For example, if it is based on TAU, then ASSAP will change the ASSAP track priority to the following: RA alerts, TA alerts, ASA Application Alerts, Coupled traffic, Selected traffic, and then those with the smallest time to CPA .
    c. The ASSAP group will propose to the CDTI group that ASSAP will be responsible for implementing the track priority.

8. Tracking Capacity Discussion/Status
    a. ASSAP tracking capacity should be based on satisfying the coverage volume required for the 5 ASA applications in consideration. The CD application has the worst case coverage volume for airborne traffic and the ASSA/FAROA applications have the worst case coverage volume for surface traffic. The group discussed different ways to determine the tracking capacity based on TCAS experience and estimated traffic densities from the LA2020 analysis.
    b. **Action Item (Don Walker):** Determine how TCAS defined their tracking capacity and how it was evaluated. This information will be helpful in the determination of ASSAP's tracking capacity.
    c. **Action Item (Randy/APL)**: Randy said that there are 200 aircraft within 12 Nmi and +/- 4000' from the LA2020 scenario; the ASSAP group requested to know the distribution of aircraft types (Surface, Airborne, GA, etc.) for the 200 aircraft.
    d. **Action Item:** How was the coverage volume of 45 NMI and +/- 15,600' determined for the CD application? This information will be helpful in the determination of ASSAP's tracking capacity.
    e. **Action Item (Tom / Garmin):** Randy mentioned that Garmin may have a CD application. The ASSAP group requested to know how Garmin defined their tracking capacity to support their CD application. This information will be helpful in the determination of ASSAP's tracking capacity.
    f. The LA2020 scenario contains 6 aircraft within 50Nm in low density airspace and 257 aircraft in the LA2020 scneario (see Table 3-11 of ASA MASPS). Based on the CD application, the alerts in the terminal area are based on a 600kt closure rate and a 90 sec collision detection threshold which would require a coverage volume of approximately 15 Nm. For the LA2020 scenario, the worst case number of traffic within 18 Nm (i.e., 15 NM plus 3 NM for CDZ around the edge of the volume), the total would be about 93 airborne aircraft. Taking into account the tracking

capacity for 30 surface traffic, the total tracking capacity would be about 120 aircraft.

1. **Action Item (Randy / APL):** Provide a white paper justifying the minimum number of traffic required to track based on discussions during the group meeting. The proposed minimum number of aircraft for ASSAP to track was about 120 aircraft.

g. **Action Item (Don Walker):** The ASSA and FAROA applications require a minimum of 30 closest surface traffic to be tracked and displayed. Discussions took place regarding if this is satisfactory for traffic of concern around the active runway. The ASSAP group requested to know how many aircraft with transponders exist today on an airport. This information will be helpful in determining approximately how many aircraft may be transmitting ADS-B data on the surface in the future.

DAY 2:

The ASSAP MOPS group meeting, on 23 August 2006, started at 9:10 AM (Pacific Time). Roxaneh, chairman, started the meeting with introductions and reviewing the proposed agenda.

1. The proposed agenda was accepted with no changes. Also, the action items from the previous day were reviewed and accepted.

2. Discuss ASSAP / CDTI Interface within ASSAP WG in preparation for the joint meeting on day 3
   a. Issue # I1: Are control panel / pilot input sent via CDTI to ASSAP?
      i. Yes, Figure 2-6 in the ASA MASPS shows the inputs into the CDTI.
   b. Issue # I2: Is the selection of an application external to ASSAP?
      i. Valid question for discussion with the CDTI group. A related question came up: When there are multiple background applications running, how does ASSAP know which application's minimum quality/integrity criteria to use for which tracks? Jonathan proposed that surface traffic follows the ASSA/FAROA requirements and airborne traffic follows the EVAcq requirements.
   c. Issue # I3: What is the minimum number of tracks sent to the CDTI?
      i. Valid question for discussion with the CDTI group. Should all the traffic be sent to the display or just a minimum required for the CDTI?
   d. Issue # I4: Should the prioritization / filtering take place in the ASSAP or CDTI?
      i. Valid question for discussion with the CDTI group. The ASSAP group will propose that this is an ASSAP requirement.
   e. Issue # I5: What is the priority selection logic of tracks shown on the CDTI?

i. Tom Eich proposed a priority that can be discussed with the CDTI group.

f. Issue # I6: How is the TCAS Tag / Cross Reference Information used by the CDTI? How should it be generated? When is the TCAS symbol shown on the CDTI?
   i. ASSAP proposes that correlation tags are not required. ASSAP will send the best tracks including TCAS. TCAS alert status is required to send along with the tracks to the CDTI.

g. Issue # I7: How is the Assured Normal Separation Distance (ANSD) generated for the CD application?
   i. ASSAP will propose that ANSD is a required input. But could be implemented various ways such as coming from a pilot input, a ground link, or an automated method based on phase of flight.
   ii. If the automated method is used then ASSAP may have to provide the ANSD value to the CDTI for display.
   iii. **Action Item (Peter Skaves):** Peter will provide flight phase definition to the ASSAP group based on Boeing aircraft. This information may be used as a resource for determining the ANSD value automatically based on phase of flight.

h. Issue # I8: The use of TIS-B Service Indicator is still being considered.
   i. Valid question for discussion with the CDTI group.

i. Issue # I9: If CDTI must accommodate the display of traffic data with simultaneous overlay of terrain or FIS-B products when integrated into an MFD, do any of the resulting requirements affect the interface between ASSAP and CDTI?
   i. This is currently out of the scope for ASSAP but may be considered in the future. This issue will not be discussed with the CDTI group.

j. Louis proposed discussing CDTI requirements for switching from ASSAP to TCAS traffic when ASSAP is failed. Need to also define timing requirements for failures and switching.

k. Louis proposed discussing about annunciating ASSAP and ASA application failures on the CDTI provided by ASSAP.

3. **New issue:** Don Walker mentioned that the tracking of surface traffic may have issues when velocity is below 50Kts. The ASA Apps have requirements for velocity to be accurate (3m/s for ASSA & FAROA)

4. Issue # AP3: Scaling/Tradeoff of NIC/SIL for Applications (Joel Wichgers / Rockwell Collins) Ref. Wichgers_Scaling_Discussion_AI#31_2006-08-10.ppt
   a. Legacy C129 transponders are certified to 10-5 and cannot achieve a SIL of 3.
   b. **Action Item (MITRE):** Perform ADS-B availability studies in regards to NIC and SIL.

c. **Action Item (Joel W.):** Joel will provide some preliminary NIC/NAC/SIL threshold values for the initial 5 ASA applications based on his proposed alternative 3.

5. Jonathan clarified that only accuracy information is required for the EVacq application. Since the integrity containment risk is only 10-2, the NACp (95%) accuracy is sufficient and NIC/SIL are not required. (Reference: Note 2 in Appendix C-2: It is expected that the 0.01 integrity risk will be supported without explicit integrity monitoring; the 1nm requirement is intended to be consistent with 0.5 nm accuracy (95%).) According to the ASA MASPS, traffic would only be removed when the equivalent uncertainty is greater than 60 degrees (determined based on NACp and traffic range).

6. Jonathan proposed that ASSAP should add an agenda item to discuss the ASSAP schedule. The FAA request of March '08 is fairly firm.
   a. **Action Item (Roxaneh)**: Roxaneh to update the schedule out to March '08. Also update the outline and schedule taking into account the current issues.

7. SP18: How long should ASSAP wait to declare an (established) TIS-B or ADS-B track?
   a. **Action Item (Jonathan H. for Cascade; Randy for APL):** Provide a list of ADS-B anomalies based on Cascade and APL studies. This action is related to how long ASSAP should wait until establishing a track. Based on the types of anomalies ASSAP may decide not to establish a track until more than one report is received.

DAY 3:

The ASSAP MOPS group meeting, on 24 August 2006, started at 9:10 AM (Pacific Time). Sethu, chairman of the CDTI MOPS group, started the meeting with introductions and reviewing the proposed agenda. Refer to the CDTI minutes for a list of CDTI attendees.

1. Roxaneh presented an overview of the ASSAP Surveillance Processing and Application Processing functions.
   a. A comment was made that the interface between ASSAP and CDTI should be performance based and not hardware dependent. For example ASSAP and CDTI can be in the same box or in separate boxes.
   b. During the Applications Processing discussion, the new proposed In-Service Status information was discussed. The CDTI group proposed making provision for an optional annunciation on the CDTI when ownship is outside service coverage. Should the actual service volume boundaries be supplied to the CDTI for display? Based on the implementation for determining the actual service volume, ASSAP may have to calculate the service volume and provide a flag to the CDTI.

c. **Action Item (Roxaneh):** Roxaneh will send Sethu a description regarding the TIS-B service status from a RTCA document.
d. The CDTI group asked which applications the ASSAP group was going to consider for the ASSAP MOPS. ASSAP plans to only focus on the first 5 ASA applications.
e. Louis B. brought up an issue regarding the possibility that the display of traffic on the CDTI may not be what the controllers are seeing. Louis suggested coordinating with the ground station on how the fusion/selection criteria should be implemented to match displays.
    i. **Action Item (Roxaneh):** Roxaneh will investigate the issue of mismatched traffic between the CDTI and what the ground controllers are seeing.

2. The CDTI group presented a list of questions related to interface issues with ASSAP:
    a. When will the applications start and stop? Starting an application may require a crew input. Stopping an application may be based on both automation and crew input. Background applications may run all the time. If an application is started automatically, may want to require a means to manually turn an application on and off. Jonathan proposed that the applications are always running in the background. Airborne traffic would follow the EVacq requirements and all surface traffic would follow the ASSA/FAROA requirements. This may cause an issue when traffic transitions back and forth between airborne and on-ground since the display requirements are different.
        i. **Action Item (Jonathan, Sethu):** The CDTI and ASSAP group agreed that the application selection issue needs further discussion. Two proposals from Jonathan and Sethu will be further discussed.
        ii. **Action Item**: ASSAP to consider turning CD off below some altitude threshold; for example, TCAS inhibits RAs below 1000'.
    b. Where will track filtering be accomplished? ASSAP plans to track a minimum number of 120 A/Vs based on meeting the coverage volume requirements for the CD and ASSA/FAROA applications. ASSAP will also have a requirement to pass a minimum number of traffic to the CDTI based on the display minimum.
        i. **CDTI Action Item:** The CDTI group will provide the minimum number of traffic required to display to the ASSAP group. This number will drive the minimum number of traffic required for ASSAP to send to the CDTI.
    c. How will multiple traffic sources be correlated? The correlation will be based on matching Mode S addresses and with spatial correlation criteria. The exact details have not been decided. After traffic sources have been correlated, ASSAP will ensure that the best track is sent to the CDTI.
    d. What does tagging TCAS mean? – Traffic sources are tagged when they are correlated with TCAS. ASSAP has decided that this tagging is an option (and MOPS can write requirements for the option) . This issue may

have to be re-addressed in the future to determine if it is required by the CDTI.

e. Should ASSAP select the closer of the positions (TCAS or TIS-B)? Tom mentioned that this may cause constant switching between the two sources. Currently, ASSAP plans to select the best track based on spatial correlation and best accuracy/integrity information.
f. Will ASSAP need to know the selected target? - ASSAP will need to know both the coupled and selected targets for the priority track scheme. The ASSAP track priority scheme is as follows: RA traffic, TA traffic, ASA App Alerts, Coupled traffic, Selected traffic, and then those closest in range.
g. Does ASSAP require any selected data from the CD application? - ASSAP needs the ANSD value which could come from various sources such as a pilot input from the CDTI, a ground link, or an automated method based on phase of flight. The CDTI group will require an ANSD annunciation to be displayed on the CDTI.
h. Low level alert disable – This is currently an optional feature for the CDTI. There was also a discussion regarding the need of an aural inhibit for CD. The CDTI group will propose some requirements for alert inhibits. The CDTI group believes that the inhibits should be sent directly to ASSAP.
i. Own-ship planned final approach speed. This value is not part of the first 5 applications and not within the scope of our initial requirements.
j. Own-ship category – Not required for the first 5 applications and not within the scope of our initial requirements.
k. ASSAP to CDTI attributes defined in Table 3-21 of the ASA MASPS – Table 3-21 requires display range / map scale and display orientation to be sent to the CDTI. This should not be an ASSAP requirement because the CDTI should be able to receive this information from any source.
    i. **Action Item (Tom, ACSS; Randy, APL):** Create a white paper to deviate from Table 3-21 requiring display range / map scale and display orientation. Also check if there are other parameters in question. Some of the parameters may only be optional. Also, ACL and TQL are not expected for the initial release of the ASSAP MOPS.
    ii. **Action Item (Tom, ACSS; Randy, APL):** Own-ship information to the CDTI is missing in Table 3-21 of the ASA MASPS such as lat/lon, ground speed, etc. Review the data from the STP document and propose which parameters need to be sent to the CDTI.
    iii. CDTI requirements for providing a perimeter around traffic based on Length/Width codes are optional. **Action Item** – CDTI and ASSAP group should review the interface parameters in Table 3-21 in the ASA MASPS and decide which ones are optional versus required.

l. **Action Item (Roxaneh & Tom)** – Coordinate MOPS document assembly issues between the ASSAP and CDTI group.
m. Traffic should be displayed based on horizontal range. ASSAP will ensure that all traffic is sent to the CDTI based on horizontal range including converting TCAS from slant to horizontal if needed.

3. The ASSAP group presented a list of questions related to interface issues with the CDTI (the list was shortened due to being addressed during the CDTI questions)**:**
   a. Does the CDTI have a latency requirement from F to G. Both the ASSAP and CDTI group agrees that the values defined in the ASA MASPS are not realistic. The ASA MASPS does say that these values are preliminary and subject to change.
      i. **Action Item:** The ASSAP group will propose some latency requirements between ASSAP and the CDTI. A white paper will also be written to resolve requirements that deviate from the ASA MASPS.
   b. Detection of ASSAP and application failures will be send to the display; including startup information.

4. The coordination meeting between ASSAP and CDTI ended at 3PM. ASSAP continued for the rest of the day to discuss open issues.

5. Correlation and best track selection requirements.
   a. For sources that indicate ICAO addresses, correlation will be determined by matching addresses and the use of spatial correlation that based on NAC. For sources that do not indicate ICAO addresses, correlation will have to be determined only by the use of spatial correlation.
   b. The following table was developed to determine the number of tracks that would be displayed based on various correlation situations.

Mode S Surv Source (ADS-B or TIS-B)	Mode S XPDR	Inside Correlation Window	Addresses Match	Number of tracks
y	y	y	y	1
y	y	y	n	2
y	y	n	y	2
y	y	n	n	2
y	n	y	y	Not possible
Y	n	y	n	M/N
y	n	n	y	Not possible
y	n	n	n	2
n	y	y	y	Not possible
n	y	y	n	M/N
n	y	n	y	Not possible
n	y	n	n	2
n	n	y	y	Not possible

n	n	y	n	M/N
n	n	n	n	2

6. Issue #SP 6: Are there any issues with receiving messages from multiple links for the same a/v (i.e., UAT and 1090ES)? Ref. ASSAS Issue #SP6-Dual Link Reception.ppt.
    a. Roxaneh presented a quick summary about this issue. Since we ran out of time, this issue will be discussed further in a future meeting.